

C L A I M S

1. A method for processing a target substrate in a semiconductor processing apparatus, the method comprising:

5 controlling temperature of a first substrate to be at a process temperature inside a process container, while supplying a process gas into the process container, thereby subjecting the first substrate to a semiconductor process, during which a by-product film
10 is formed on an inner surface of the process container;

 subsequently to the semiconductor process and unload of the first substrate out of the process container, supplying a reforming gas into the process container, thereby subjecting the by-product film to
15 a reformation process, which is set to reduce thermal reflectivity of the by-product film; and

 subsequently to the reformation process, controlling temperature of a second substrate to be at the process temperature inside the process container,
20 while supplying the process gas into the process container, thereby subjecting the second substrate to the semiconductor process.

2. The method according to claim 1, wherein the reformation process is set to change color of the
25 by-product film to white or transparent.

3. The method according to claim 1, wherein the reformation process is set to change light transmission

of the by-product film to be 70% or more.

4. The method according to claim 1, wherein the by-product film containing a metal nitride as a main component.

5 5. The method according to claim 4, wherein the metal nitride is titanium nitride.

6. The method according to claim 4, wherein the reforming gas is a gas that oxidizes the by-product film.

10 7. The method according to claim 6, wherein the reforming gas comprises oxygen, oxygen radicals, or ozone.

8. The method according to claim 6, wherein the reformation process is performed at a reforming temperature sufficiently higher than the process temperature.

9. The method according to claim 1, wherein the reformation process and the semiconductor process are alternately repeated.

20 10. The method according to claim 1, wherein the reformation process is performed after the semiconductor process is repeated a plurality of times without the reformation process.

25 11. The method according to claim 1, wherein the semiconductor process is a process for forming a thin film on a target substrate by a CVD process.

12. A method for processing a target substrate in

a semiconductor processing apparatus, the method comprising:

controlling temperature of a first substrate to be at a process temperature inside a process container, while supplying a process gas into the process container, thereby forming a thin film containing a metal nitride as a main component on the first substrate by a CVD process, during which a by-product film containing a metal nitride as a main component is formed on an inner surface of the process container;

subsequently to the CVD process and unload of the first substrate out of the process container, supplying a reforming gas into the process container, thereby subjecting the by-product film to a reformation process, which is set to oxidizes the by-product film with the reforming gas at a reforming temperature sufficiently higher than the process temperature, so as to reduce thermal reflectivity of the by-product film; and

subsequently to the reformation process, controlling temperature of a second substrate to be at the process temperature inside the process container, while supplying the process gas into the process container, thereby forming a thin film on the second substrate by the CVD process.

13. The method according to claim 12, wherein the reforming gas comprises oxygen, oxygen radicals, or

ozone.

14. The method according to claim 12, wherein the process gas comprises a halogenated metal gas, and a gas containing N and H.

5 15. The method according to claim 14, wherein the halogenated metal gas is titanium tetrachloride.

16. The method according to claim 14, wherein the gas containing N and H is ammonia.

10 17. The method according to claim 12, wherein the process container is configured to accommodate a plurality of target substrates at intervals in a vertical direction, the target substrates are heated by a heater disposed around the process container, and the by-product film is present between the target
15 substrates and the heater.

18. A semiconductor processing apparatus comprising;

a process container configured to accommodate a target substrate;

20 a heater configured to heat the target substrate accommodated in the process container;

a gas supply section configured to supply a necessary gas into the process container; and

25 a control section configured to control the heater and the gas supply section,

wherein the control section is preset to execute controlling temperature of a first substrate to be

at a process temperature inside the process container,
while supplying a process gas into the process
container, thereby subjecting the first substrate to
a semiconductor process, during which a by-product film
5 is formed on an inner surface of the process container;

subsequently to the semiconductor process and
unload of the first substrate out of the process
container, supplying a reforming gas into the process
container, thereby subjecting the by-product film to
10 a reformation process, which is set to reduce thermal
reflectivity of the by-product film; and

subsequently to the reformation process, control-
ling temperature of a second substrate to be at the
process temperature inside the process container, while
15 supplying the process gas into the process container,
thereby subjecting the second substrate to the
semiconductor process.